solutions, drinking nozzles were exchanged randomly, and relative positions of saline and water were reversed. It was hoped that this relatively long period between position alternations would allow more stable preference behaviour to develop.

Fig. 1 shows the preference-aversion functions of the black and white strains. Differences between black and white animals did not approach significance at any saline concentration. There were no observable differences between individual strains. However, because a few animals temporarily escaped and on recapture could be identified with certainty for pigment but not strain, statistical analyses of strain differences were not performed.

At each concentration, *t* tests were applied to the differences between amounts of water and saline ingested using the pooled data of all animals. The discrimination (preference) threshold falls between 0.01 and 0.033 molar, which is within the range of that found for the rat¹. Significant saline preferences were obtained at concentrations of 0.033 molar ($P < 0.01$) and 0.10 molar ($P < 0.05$). A significant saline aversion occurred at 0.333 molar ($P < 0.001$). These '*P*' values represent two-tailed tests.

These results indicate: (a) that mice produce a typical saline preference-aversion function when offered saline solutions of different concentration in addition to distilled water; (b) the suggested relationship between pigmentation and taste sensitivity or appetite for sodium chloride was not confirmed.

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Heart Rate during Auditory Vigilance Performance

THE work recorded here is the first in a series of experiments designed to investigate the relationship between cardiac activity and the performance of monotonous tasks and tasks involving high rates of information processing.

Since drowsiness is commonly reported by subjects of vigilance experiments it is to be expected that this would be reflected in a decrease in heart rate during a vigil, and it is possible that this decline will be related systematically to the decrease in the number of signals detected correctly during different periods of the vigil. Furthermore, Lacey and Lacey¹ have suggested that variability in resting heart rate may be indicative of the quality of performance shown by subjects engaged on perceptual-motor tasks. They differentiate between those subjects who show high variability (labiles) and those who show low variability (stabiles) and suggest that each group is liable to show consistent modes of responding and to commit specific types of errors. Although they have not used vigilance tasks in their investigations the implication seems to be that the more variable the heart rate at rest the more are commissive errors likely to occur in vigilance situations.

In the present work, electro-cardiographic recordings were taken from eight subjects (mean age 21.5 years) in an auditory vigilance situation. The task consisted of a tape-recording of a series of digits, 1-9 inclusive, recorded in random order at the rate of 1/sec. The signal to be detected consisted of a series of three successive odd digits which were all different. There were 24 such signals during the 60-min task, six occurring at random intervals during each 15-min period. Subjects responded by pressing a key which was attached to an event recorder whenever they considered a signal to have occurred. Heart rate measures (the number of *R* waves/min) were taken during the following periods: (1) a 20-min pre-task resting period; (2) the first 7 min of the task; (3) the ninth, twelfth, fifteenth . . . fifty-first min of the task; (4) the last 8 min of the task; (5) during a 10-min post-task resting period.

The mean heart rate for each subject for each 15-min period was divided by his mean heart rate during the pre-task resting period. These 'working-resting' ratios were then transformed into *Z*-scores for the group. Performance scores (the number of correct detections) for each 15-min period were also transformed into *Z*-scores for the group. These data are given in Table 1, from which it will be seen that heart rate and performance both decline during the course of the vigil.

Table 1. RELATIONSHIP BETWEEN HEART RATE AND VIGILANCE PERFORMANCE DURING THE COURSE OF THE EXPERIMENT

15-min periods	<i>Z</i> scores Performance	<i>Z</i> scores Heart rate
1	+ 1.60	+ 1.40
2	0.00	+ 0.20
3	- 0.50	- 0.80
4	- 1.00	- 1.30

The results seem to indicate a systematic relationship between heart rate and vigilance performance. It is not possible, however, to interpret this easily in terms of decreasing activation during the course of the vigil, since for this to be the case the beginning of the task should be accompanied by a substantial increase in heart rate. In the case of only one subject was this observed, and all mean working-resting ratios were less than unity.

Lacey² considers that a deceleration in heart rate is associated with the uptake of information. It seems possible that the deceleration observed in this work may be due to increased attempts by subjects to take up information from the task and the environment as the vigil proceeded.

Subjects were ranked in terms of variability of resting heart rate, in terms of total error score (that is, errors of omission and of commission combined), and in terms of errors of commission only. The rank-order correlation between heart rate variability and total error score is given by $\tau = 0.69$ ($h = 2.02$, $P < 0.01$), and between heart rate variability and commissive error score by $\tau = 0.42$ (non-significant).

It is difficult on the basis of the results of this work, in which only eight subjects participated, to draw any reliable conclusions about individual differences in detection ability and their prediction; but the significant correlation between cardiac lability and total error score suggests that heart rate variability may be some prediction of vigilance performance, although it seems unlikely that it will efficiently predict commissive errors in performance.

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